

Financing eGovernment Business Transactions: Empirical Estimates of Willingness to Pay*

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ABSTRACT

A growing body of empirical work describes the breadth and depth of the supply of state websites available for online transactions with state agencies. There is a large untapped potential for improved effectiveness and efficiency in public service delivery—for both firms and agencies—if more transactions with government could be conducted online. This paper combines elements of transactions cost theory and public goods theory to develop a model for financing eGovernment transactions. A survey of over 400 firms tests key elements of the model and the results present implications for the pricing structures of online transactions and financing strategies by government agencies.

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Introduction

There is general agreement among eGovernment scholars that state governments are entering the transactions-based phase of eGovernment development (West 2004, Layne and Lee 2001, Reddick 2004, Wang and Rubin 2004). A growing body of empirical work has described the breadth and depth of the supply of state websites available for online transactions with state agencies. Yet many public agencies currently provide mostly “billboard” information on agency websites. There is a large untapped potential for improved effectiveness and efficiency in public service delivery—for both firms and agencies—if more transactions with government could be conducted online. For example, it is now possible to pay federal and state income taxes online in the US and in many states. Online filing of income taxes reduces transactions costs for both filers and the revenue agencies due to the reduced paper handling and a lower number of errors with online filings. There are two important barriers to further development of online agency services in many states: [1] which agency transactions should be moved online and [2] what pricing structures should be used to recover costs, sustain operations, or both.

The IOWAccess Advisory Council recommends funding of requests by state agencies in Iowa to develop online services for firms and citizens. Unfortunately, the council lacks data regarding actual demands by firms and citizens for the online services proposed by state agencies. Moreover, there is very little research on the demand for eGovernment services (e.g., Momentum 2000). The council commissioned a survey of firms to ascertain their current and future demand for online transactions with state agencies, and their preferences for user charges and payment methods. General results of the survey are reported elsewhere (Chen and Thurmaier 2005). This paper focuses on the willingness of firms to pay for online transactions, and the implications of these results for state agency pricing structures for online transactions.

Research on financing online transactions in eGovernment is relatively scarce. Wang and Rubin (2004) and Herbst (2001) discuss related issues about using e-finance (electronic payments) with online transactions. Yet these and other studies do not develop a pricing model for determining transactions charges for online services. We approach the evolution of eGovernment services from the theoretical perspective of the demand for online agency services, and models of pricing structures that can fund the development of online agency services—given the willingness of businesses and citizens to pay for the online services. First, we define demand for an online service to include a willingness to pay for the service. Second, we construct an eGovernment pricing framework based on public goods principles. Third, we use transactions cost analysis and indifference curve analysis to argue that firms are willing to pay for online transactions at a price less than or equal to their perceived cost to conduct a particular transaction in a traditional paper method. We then use empirical results from a survey of over 400 firms to test key elements of the model.

The results suggest ways that public agencies can improve financial management by channeling resources to high-impact eGovernment projects and develop financing mechanisms for sustaining the development of priority projects. Agencies can improve their financial management by correctly pricing services based on the demands of firms for the online services, and the type of online service provided by the agency.

The paper begins with review of the literature regarding online transactions in state governments of the US, research on financing eGovernment transactions, and transactions cost theory. We then combine elements of transactions cost theory and public goods theory to develop a model for financing eGovernment transactions, and state several hypotheses implied by the model. After briefly discussing the methodology, we report the results of the survey and conclude with a discussion of the implications for the pricing structures of online transactions and financing strategies by state agencies. The results of the study are generalizable beyond the US.

Financing eGovernment Transactions: A Literature Review

The need to focus on transactions

Various models of eGovernment transformation include a stage where agencies move past static “billboard” information sites to offer citizens and firms the ability to conduct transactions with agencies and offer interactive connectivity between citizens and public officials in agencies (West 2004, Layne and Lee 2001, Reddick 2004, Wang and Rubin 2004). The various stages typically involve increasing levels of complexity and different levels of governmental integration.

Layne and Lee (2001) call their second stage of development ‘transaction-based’ eGovernment. They argue that citizens will demand to fulfill government requirements on-line instead of having to go to a specific location to complete paperwork because “electronic transactions offer a better hope for improved efficiency for both the customer and the agency than simply cataloguing information” (128). EGovernment at this stage includes putting live database links to on-line interfaces, so that, for example, citizens may renew their licenses and pay fines on-line. “In ideal cases, web transactions should be posted directly to the internally functioning government systems with minimal interaction with government staff” (125).

Wisconsin, Washington, Michigan, Oregon and Iowa are among the few states pioneering the development of e-commerce by state governments. For example, Michigan launched a process in 2003 that allows permitted facilities to send the data directly to a state database for EPA monthly reports (Perlman 2004); Iowa has the nation’s highest rate of e-filing of state income taxes, and firms can now pay sales and withholding taxes online (Glover 2004). Yet states generally have been slow to develop in the second stage model. Norris and Moon (2005, 69) report that while almost 66 percent of local governments in a 2002 survey allow firms to download forms for manual completion, only about 11 percent allow permit application or renewal and less than 6 percent offer online financial transactions such as online business license application or renewal. Increases in online transaction capability between 2000 and 2002 were very modest.

Financing Mechanisms

There are multiple reasons for the seemingly slow pace of eGovernment evolution. Layne and Lee note that “organizational challenges are much greater in this stage. Existing electronic databases must be reprogrammed to handle such changes requiring internal committees to assess user demands and user interfaces in current systems. Issues of confidentiality and security must be addressed by the organization as a whole....It may not be possible to provide an interface for the citizen-customer without considerable investments.” (2004, 129) Indeed, Johnson (2002, 40) finds state governments report spending an average of \$2 million on enterprise portals, some as high as \$6.5 million.

The financial barrier is an important issue, and the focus of this study. West (2004: 25) observes that paying for eGovernment infrastructure remains a pressing challenge because most states have not made the expansion of eGovernment a major budgetary priority. “The typical American state spends 1 percent-2 percent on information technology, which makes it difficult for there to be rapid progress in placing information and services online” (ibid). Commercial advertising poses risk in commercializing government and creating “potential conflicts of interest for government agencies.” User fees restrict access by disenfranchising “people of limited means and widening the digital divide between the rich and poor in the United States. Given the revolutionary potential of e-government, it makes sense to support it with tax dollars, the way other government services are financed” (ibid).

Johnson (2002) studies the financing of state web portals and strongly argues for a two-part strategy to finance eGovernment developments. In his view, Web portals are key investments that should be treated as such because they have long-term benefits, large initial costs, and they require technical planning and maintenance. Johnson contends that states should use GASB34 principals for enterprise funds as financing mechanisms. An enterprise fund approach allows the state to reinvest fees and savings in portal maintenance and development and recover costs, including capital costs. It

is critical that the long-term benefit stream be captured by pricing fees in this model. This is feasible, he maintains, if the development of e-services is customer and client driven.

Nature of Good for eGovernment Services

Robbins and Miller (2004) consider the characteristics of eGovernment phases as primarily consumption or investment, the benefit incidence of each phase, and the burden of paying these benefits when they conclude that equity and efficiency are most likely achieved when a fee-based financing structure is used for most phases. Their analysis focuses mainly on services for citizens, and the incidence analysis is affected by the disparities in payments and benefits arising from the digital divide among individuals.

Robbins and Miller observe that eGovernment services are often quasi-public goods. Most are non-exhaustive, though many are excludable. Any number of people can visit a government website without depleting the service (though there may be congestion costs). And once a report or form is posted on the net, anyone with a connection can retrieve the document (non-excludable). Similarly, if a user has the ability to pay a fine or file a permit online, any enduser may do so, provided they have access to the Web. They argue that the digital divide creates an exclusionary affect for these online transactions with respect to citizens.

While they acknowledge that most firms have Internet access and often broadband access, they do not distinguish between transactions for firms and those for individuals in their analysis. The distinction is important. If firms are ubiquitously online, then there is no digital divide with respect to business services and therefore access is broadly non-exclusive. On the other hand, online services can be exclusionary if one may be prohibited from using an online transaction service if access requires payment of a subscription fee or transaction charge.

Another aspect of eGovernment financing is a distinction between consumption and investment spending. Robbins and Miller argue that much of the spending in all four phases of eGovernment evolution is consumption spending, with immediate benefits to the enduser, and hence should be financed with user charges. Some of the spending in the transactional and integrative phases, however, is investment spending and the benefits to society are longer term and more widely distributed. That is because moving transactions online can improve the overall efficiency of the agency operations; lowering the cost of government (at least for those services) benefits all taxpayers and investments in increased operational efficiency pay long-term benefits. They concur with Johnson (2002) that investment expenditures should be financed with general fund dollars rather than user charges, to the extent that the benefits accrue to society at large rather than individual users.

These arguments raise the issue of what policies are useful in determining the cost of access to online government transactions. Robbins and Miller, and much of the other eGovernment literature focuses on government-to-citizen (G2C) commerce, rather than government-to-business (G2B) commerce. While the former are affected by issues of the digital divide, the latter are not. Our focus is on G2B transactions. A pricing model is critical to the development of online services because firms that are willing to pay for services can be important sources of revenue for financing eGovernment services on state government portals. We next draw upon public goods theory, transaction costs theory, and indifference curve analysis to develop a pricing model for G2B commerce in the transactions phase of eGovernment development. The model generates several hypotheses which are tested with our survey data.

Toward a Pricing Model for eGovernment Transactions with Firms

Figure 1 presents a framework for considering pricing structures of an agency's online transactions with firms.¹ There are three types of online G2B services that can be provided by an agency. The

¹ We are indebted to John Gillispie, Chief Information Officer for Iowa, for the idea of the transaction pyramid.

most basic service level corresponds to services provided only by government and that are required of all firms, regardless of their type of business. Paying taxes is a good example. All firms must pay taxes; there is no option and the transaction does not depend upon the type of business. Paying taxes has broad social benefits (externalities) and minimal consumptive benefits to the firm as a taxpayer.

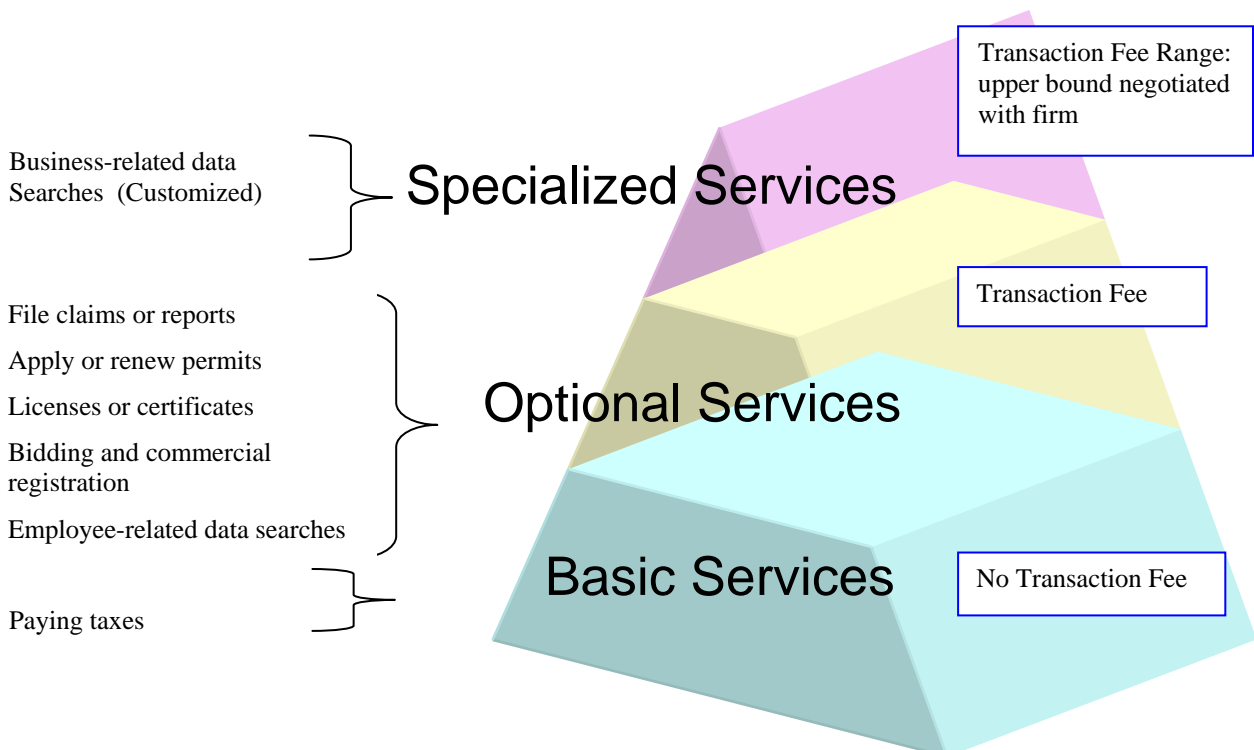
The second level of online services includes those optional transactions that firms perform for the privilege of conducting specific business activities. These include bidding for agency procurement contracts, filing or renewing permits and licenses, and filing claims or reports required by various regulations. These services have social benefits to the extent that they regulate firms to protect the health and welfare of the public, but most of the benefit flows directly to the firm bidding on a contract, paying a license fee, or seeking a permit for the privilege of doing business in a state. In accord with Johnson (2002) and Robbins and Miller (2004) we expect that:

H1: firms are willing to pay user charges to fund development of online services by agencies.

Firms will be amenable to a transaction fee because the firm is willing to pay a charge for the privilege of doing business in the state and view them as a necessary cost of doing business. This is in contrast to a transaction fee to pay taxes; Crawford, Johnson & Northcott (1999) found strong resistance from firms to the suggestion that e-payment of taxes should involve a surcharge as well.

The third tier of transactions includes services an agency can provide that are comparable to a private good. That is, the service is both exhaustive and exclusionary; if the agency provides the service to one business, it cannot at the same time provide the same service to another firm. Moreover, unless the business (as a customer) is willing to pay for the service, the agency is under no obligation to provide it. The agency may have authority to provide the service, but it is under no mandate to do so. A good example of this type of service would be a customized search of a database that requires special programming and hence extraordinary staff time for someone in the agency to compile the search and provide the firm with the requested product, a customized dataset of information. The benefits of this service flow exclusively to the firm, with little or no social benefit or externality.

Figure 1. Transaction Pyramid for Pricing Framework for eGovernment Services



The more important point of the transaction pyramid is that the different tiers of service imply different pricing structures for those services. The examples provided in this exercise are not exhaustive; they are merely representative of the sort of transactions that fall into each category. At the basic service level, there is little justification for charging a firm additional fees for a transaction. For example, the firm is already paying taxes, and paying a fee to pay compulsory taxes is inappropriate. We agree with Johnson (2002) that IT infrastructure for these services should be treated as capital investments, funded by general taxes. These basic services that resemble pure public goods should generally be paid through general tax dollars, not transaction surcharges.

On the other hand, transactions in the specialized tier can command high user charges, since those services are specific to a firm's particular request and amount to a commodity for which the firm is willing to pay. The price of these services is limited only by the value of the commodity or service to the firm, but can be fixed at a minimum to equal the extra cost to the agency staff of providing the customized service.

Our focus is on transactions in the convenience tier, a wide range of services that have much potential for conversion to online services by state agencies. Layne and Lee (2004, 128) contend that "Government evolved to the transaction stage "will make service delivery more efficient and increase savings for both government and the citizen....(It) empowers citizens to deal with their governments on-line anytime, saving hours of paperwork, the inconvenience of traveling to a government office and time spent waiting in line." The focus of creating online transaction options is to reduce both the time involved for a firm to conduct the transaction as well as the inconvenience of forcing the transaction to occur within specified hours of operation for a particular agency office. In both ways, transaction costs are reduced for the firm.

Transactions Analysis Framework

Transaction cost theory is a powerful and general analytical instrument that has many applications to public sector finance (Bartle and Ma 1999).² Most economic relations can be formulated as contracting problems and can be analyzed in terms of the costs of transacting the contract. Simply stated, transaction costs are the costs of making an economic exchange; together with production costs they constitute total economic costs for a good or service. Transaction costs theory has been developed beyond seminal contributions by Williamson (1979) and Coase (1937) to include search and information costs, bargaining costs, and policing and enforcement costs, among others. The principal idea that we borrow from this theory is that firms incur transaction costs when they conduct business with state agencies.

The speed of the transaction with the state agency has financial consequences for a firm. For example, a firm that wants to bid for a procurement contract may place the bid through the mail, or bring the bid to the agency office for the transaction.

Both of these routes to bid for the contract accrue transactions costs. That is, in addition to the actual time required for someone to write the bid, sending it through the mail assures one or more days of delay as the mail travels to the state agency office and then is deposited in the processing pile—with all of the other bids received in the mail that day. To assure that the bid is not lost or misdirected in the mail, the firm may pay a mailing surcharge for special delivery. The cost of the bid now includes the preparation time plus the mailing costs. Alternatively, filing the bid personally at the state agency requires someone on staff (or the business owner) to travel to the agency office, perhaps pay parking costs, present the bid to the agency clerk, then travel back to the office or the next point of business—all the while accruing salary and benefit costs, not to mention vehicle maintenance costs, and so on.

Filing the bid online through the agency's website dramatically reduces the time between writing the bid and filing it with the agency, and also eliminates the costs of travel and salary time for the staff to file the bid in person. From an economic perspective, the firm can compare the relative

² See James (2004) for an extensive online bibliography of transaction cost theory.

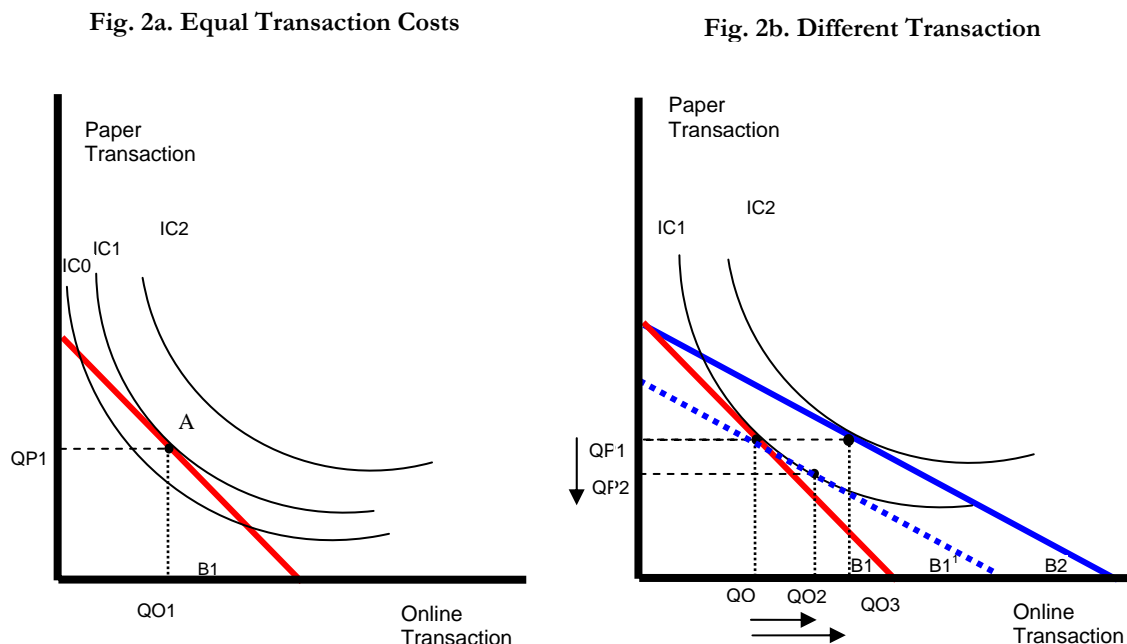
price of filing the permit online, filing in person, or filing through the mail. We can use indifference curve analysis to see why this would be so.³

Indifference Curve Analysis of Transaction Costs

Figure 2 presents the budget constraint of a firm that must conduct a bidding transaction with a state agency. The firm has a choice of a traditional paper transaction or an online transaction. The firm faces transaction costs in each case. In Figure 2a, the transaction costs for a paper or online filing are equal. The budget line (B1) illustrates all the possible combinations of paper and online transactions that can be purchased at given transactions costs and for a given firm's budget. With a limited budget the firm can only afford a limited combination of paper and online transactions, with the maximum combinations on the actual budget line (B1). An economically rational, profit maximizing firm will prefer to be on the highest possible indifference curve given its budget constraint. This point occurs where the indifference curve is tangential to the budget line. In Figure 2a, the optimum consumption point occurs at point A on indifference curve IC1.

We now introduce the case of differential transactions costs to the firm for paper and online transactions. The traditional paper transaction costs might include gas and traveling time, waiting in line, postage, or mail delay. The total cost could range from \$1 for postage to as much as 20 to 30 dollars for a personal office visit, depending on how the company handles it. For this argument, we assume that the paper transaction cost is \$15. (Note: these costs do not include actually completing the form that the firm must file with the state agency.)⁴

Figure 2. Effects of lower online transaction costs on government-to-business demand.



Alternatively, the firm could eliminate much of that cost by bidding for the contract with the agency online. The cost would be the time for the firm's personnel to go to the agency website, upload the bid (time for completing the bid is excluded from our analysis), clicking submit, and recording (on

³ This analysis parallels an explanation of indifference curve analysis found at http://www.bized.ac.uk/virtual/vla/theories/indifference_curve.htm, last accessed 23 May 2005.

⁴ One can obtain data estimating various transaction costs from the Washington State Department of Licensing study in Frank (2003), especially Attachment 6.

paper or by saving) a transaction confirmation code from the agency website. Transactions costs might also include completing account information for an e-payment option if the filing involves a fee. For this argument, we assume that the online transaction cost totals \$5, almost exclusively staff time dedicated to the transaction.

If we assume that the firm's income is held constant, and the price of one type of transaction changes, then the slope of the budget curve will change (to B1¹). In other words, the budget curve will pivot as illustrated in Figure 2b. The reduction of the price of online transactions from \$15 each to \$5 each means that on a fixed budget, the firm could increase 'consumption' of online transactions. Note that the price of paper transactions has remained fixed at \$15 each, so the maximum consumption of paper transactions remains fixed.

The increase in the quantity demanded for online transaction services is caused by both a substitution and an income effect. A substitution effect occurs when a firm switches consumption patterns to more online transactions due to the price change alone but remains on the same indifference curve. A new budget line needs to be constructed relative to the same indifference curve (IC1) to identify the substitution effect. Budget line B1¹ is added parallel with the budget line B2 and tangential to IC1. The increase in online transactions from QO1 to QO2 is purely due to the substitution effect. Note also that the demand for paper transactions falls from QP1 to QP2. The income effect results from the firm having increased purchasing power as a result of the lower transaction price. The lower price means the budget line pivots to B2, hence the optimum consumption point is QO3. This point is on a higher indifference curve (IC2).

The transaction cost framework and the indifference curve analysis reinforce the proposition that firms are willing to pay user charges for online services in the second tier of agency services. We develop two hypotheses regarding firm behavior in the face of differential transaction costs.

H2: A perception of savings with online transactions costs yields a willingness of firms to pay user charges up to a maximum amount it believes is saved in transaction costs.

The lower relative price of the online transaction (versus paper) to bid for a procurement contract, for example, will allow the firm to substitute more online for paper transactions. The maximum amount the agency should charge may be less than the total transaction cost (TC) savings of a firm. The agency can promote more total bidding from a firm by not charging a maximum amount. This allows the firm to reallocate spending from transaction costs to bid preparation or other real production. This increases the benefits to society from the online service because the lower total price of bidding on contracts (bid preparation plus TC) promotes increased competition among firms and presumably lower priced bids for agency procurement.

It is also possible that a firm's perception of transactions costs and benefits is subject to framing effects (Tversky and Kahneman 1974, 1981). That is, although the mathematical outcome is identical, the way the TC problem is presented to a firm may affect its willingness to pay a user charge for an online transaction. Thus we expect that:

H3: A perception of additional costs for online transactions yields resistance to user charges, and thus a lower willingness of firms to pay user charges than when the firm perceives savings.

Firms perceiving that a user charge for an online transaction is an additional cost of doing business, rather than a substitute—and lower—transaction cost, will resist a user charge for an online service. They may be willing to pay it for the convenience without thinking through the complete transaction cost calculation. They may especially resist the user charge if they neglect the TC analysis and only perceive that the nominal price of the online service option is higher than the paper option. This would be the reverse scenario in the indifference curve analysis above (Fig 1b); the price of the online transaction increases with a surcharge, reducing the demand for online services (from QO3 to QO1) and increasing the demand for paper transactions (from QP2 to QP1).

Markets are often missing in cases of quasi-public goods (such as online G2B services) because of the nonexcludable or nonrival nature of the commodity (i.e., there are no alternatives for a firm to bid for state contracts or pay state licenses and fees), hence the lack of a market to generate

prices for such outcomes. Contingent valuation surveys offer “a way to trace the demand curve for a public good that could not otherwise be gleaned from market data....Answering surveys may be hypothetical, but no more than buying unfamiliar or infrequent commodities” (Hanemann 1994, 20). We next discuss the contingent valuation methodology, our sample, and survey before reporting our results.

Methodology

Early in the survey, we tested H1 with these questions:

If state agencies are going to provide online services, they can either use tax dollars to pay the development costs or they can recover the development costs with a user fee for the new online service. As a general principle, which of these would you prefer?

- 1 = Use tax dollars to pay for development costs
- 2 = Charge a user fee to recover the development costs
- 3 = Other (Please specify: _____)

Do you think that a nominal user fee would discourage your company from using online services for its transactions with state agencies? Would you say it . . .

- 1 = definitely would
- 2 = probably would
- 3 = probably would not
- 4 = or definitely would not (discourage you from using online services)?

Testing H2 and H3 required more a more complex survey design. We used a contingent valuation methodology.

Contingent Valuation Applications

While there is no standard approach to the design of a contingent evaluation survey, Portney (1994, 5-6) observes that most applications involve a few well-defined elements:

1. A survey must contain a scenario or description of the (hypothetical or real) policy or program the respondent is being asked to value or vote upon.
2. The survey must contain a mechanism for eliciting value or a choice from the respondent. These mechanisms can take many forms, including open-ended questions (What is the maximum amount you would be willing to pay for X?) and bidding games (Would you be willing to pay \$x for this program? Would you be willing to pay \$x+1 for this program) and so on.
3. Contingent evaluation surveys usually elicit information on the socioeconomic characteristics of the respondents as well as other information about their attitudes and behavior. The idea is to be able to estimate a willingness-to-pay function that includes explanatory variables.

Hanemann (1994, 22) argues that details matter to assure reliability of results. “The crux is how one elicits value. The two key developments have been to confront subjects with a specific and realistic situation rather than an abstraction, and to use a closed-ended question which frames the valuation as voting in a referendum....The goal in designing a contingent valuation survey is to formulate it around a specific commodity that captures what one seeks to value, yet is plausible and meaningful.”

We use the contingent valuation method to elicit firm preferences for paying user charges for online services. Early in the survey we elicited specific transactions that firms had with state agencies, regardless of whether it were an online transaction. We then asked the firm's preference for conducting those transactions online; specifically, we asked them to identify the top three priorities for conducting transactions online (of the transactions they were already conducting with state agencies). Finally, we tested H2 and H3 by presenting the paragraph below to crystallize Transaction costs the firm might incur for each of these priority transactions.

Now please think about (FILL TRANSACTION 1) and the amount of money it currently costs your company to conduct this transaction. That could include costs such as gas and traveling time, waiting in line, postage, or mail delay. The total cost could range from \$1 for postage to as much as 20 to 30 dollars for a personal office visit, depending on how your company handles it.

Half of the firms were randomly selected for the following sequences of questions that focused on user charges as an additional cost of online commerce. The sequences were repeated for three transactions the firm had specified earlier in the survey.

COST SEQUENCE

With this in mind, would you be willing to pay \$2 for the convenience of conducting this transaction online?

1 = Yes

2 = No

Are you willing to pay \$4 (for each online transaction)?

1 = Yes

2 = No

What is the **highest** user fee per transaction that you would be willing to pay to do this online?

\$ _____

Another half of the firms were randomly selected for the alternative sequence of questions that focused on saving money by using online commerce.

SAVINGS SEQUENCE

With that in mind, would you be willing to conduct this transaction online if it would save you \$4 in the transaction cost?

1 = Yes

2 = No

Would you be willing to conduct it online if it would save you \$2 in the transaction cost?

1 = Yes

2 = No

Would you be willing to do this online if your company could **break even** on the transaction cost?

1 = Yes

2 = No

Sample and Data Collection

The project began with a comprehensive review of 46 Iowa state government web sites to determine a reliable list of electronic government services currently offered to Iowa firms. Researchers worked with ISU's Center for Survey Statistics & Methodology to develop a telephone questionnaire for the survey. Pilot interviews were conducted with six local business representatives to help identify any troublesome items and adjustments were made to the questionnaire based on the results.

The survey center randomly selected 1500 firms from about 149,000 Iowa firms were identified using the 2004-2005 edition of DirectoriesUSA's Iowa Business Directory to produce a final sample of 800 firms, stratified by Standard Industrial Classification (SIC) code groups and by number of employees. The sample of firms included non-profit organizations as well as for-profit firms, since both types of establishments would have contact with state offices and agencies. In some cases the sample also included multiple locations for the same business. We attempted to gather information one time for the business as a whole and recorded secondary locations as ineligible. A total of 800 calls were made resulting in 432 completed telephone surveys.

Advance letters were sent to firms identified in the sample to explain about the project and to inform them that an interviewer would try to contact them shortly. Standard interviewing protocols were followed by survey center staff throughout the project. The interviews were 15 to 20 minutes in length. Approximately 6% of the sampled cases were not eligible, either because they were

out of business, a duplicate listing, or simply not a business at all. About 4% of the firms could not be located. The refusal rate was 23%. Interviews were completed with 432 firms, for an overall response rate of 57%. Reported sample percentages are statistically valid within $\pm 5\%$ at the 95% confidence level. This means that, if 54% of the respondents answer a certain question affirmatively, the true percentage in the overall sampled population has a 95% chance to be between 49% and 59%. A complete description of methodology is presented in Appendix A.

Results

There are significant opportunities for the State of Iowa to implement eGovernment services. Across various types of transactions that firms currently have with state government, an average of only 30 percent are conducted online. Survey respondents indicate that about 80 percent of firms that currently do *not* conduct transactions online say that they would like to do so in the future. That translates into over half of Iowa's firms that the State of Iowa can serve with new electronic government services in addition to the 30 percent currently served. The magnitude of future demand is similar across a broad range of services from permit application and renewal to employee-related information and transactions.

More importantly, survey results indicate that firms are also willing to pay for an online service option. Firms have mixed responses to general questions about paying user charges for online transactions with state agencies. However, responses to the contingent valuation question sequences indicate that when an online service is specifically desired by a firm, it is willing to pay a user charge to save the transactions costs associated with the paper alternative. We next analyze these preferences in detail.

Survey results provided mixed support for H1 regarding the willingness of firms to pay user charges for online service options with state agencies. Iowa firms are evenly split in terms of who should pay for the development costs of eGovernment services. Of 317 responses, 47 percent of firms (162 total) prefer user fees while 45 percent (155 total) prefer the use of tax dollars. The remaining 8 percent of firms preferred a different option. Slightly more than half of the responding firms (53 percent) indicated that a nominal fee would discourage them from online transactions with government. Two-thirds of the resistant firms said it "probably would discourage" them whereas one-third of them took a stronger position, saying a user fee would "definitely discourage" them. Slightly less than half of the responding firms (47 percent) would not be discouraged by a nominal user fee. Among those who would not be discouraged, 80 percent of them said that they "probably" would *not* be discouraged. The remaining 20 percent indicated that they "definitely" would not be discouraged. As expected, the responses to these two questions are positively correlated ($\rho=0.32$) and a χ^2 test of differences is significant ($p \leq 0.001$); those that prefer user charges over taxes are less likely to be discouraged by their imposition for online transactions.

However, we found clear support for H2; firms are more willing to pay a user charge for an online transaction of direct benefit to them. During the survey, firms identified specific transactions they conducted with state agencies, most of which were *not* conducted online. Later in the survey, firms were asked about their willingness to pay a transaction fee to conduct the three most important transactions they perform with state agencies online (labeled priorities 1-3 in Table 1). Recall that firms were randomly assigned to one of two groups. Half the firms responded to a question sequence about paying for an online service, and the other half responded to a sequence about saving costs using an online service option. Responses indicate that firms are generally willing to pay slightly more than \$2 for each transaction they might have online with state agencies (Table 1). Given the contingent valuation sequence in the survey, close to 60 percent of firms are willing to pay at least \$2 per transaction if the commerce they currently conduct with the state is moved online. The number drops to about 40 percent when asked whether they will pay \$4 for their preferred transaction if it is available online.

Table 1. Percent of Firms Willing to Pay or Save Costs with Online G2B Commerce.

<i>Percent Responding Willingness to Pay/Save for</i>				Overall
	#1 Priority	#2 Priority	#3 Priority	Mean
Pay \$2	60%	54%	53%	56%
Pay \$4	40%	44%	37%	40%
Maximum Pay: (\bar{x})	\$ 2.35	\$ 2.57	\$ 1.85	\$ 2.34
(median)	\$ 2.00	\$ 2.00	\$ 1.00	
Save \$4	85%	92%	92%	90%
Save \$2	92%	95%	96%	94%
Break-even	95%	98%	100%	98%

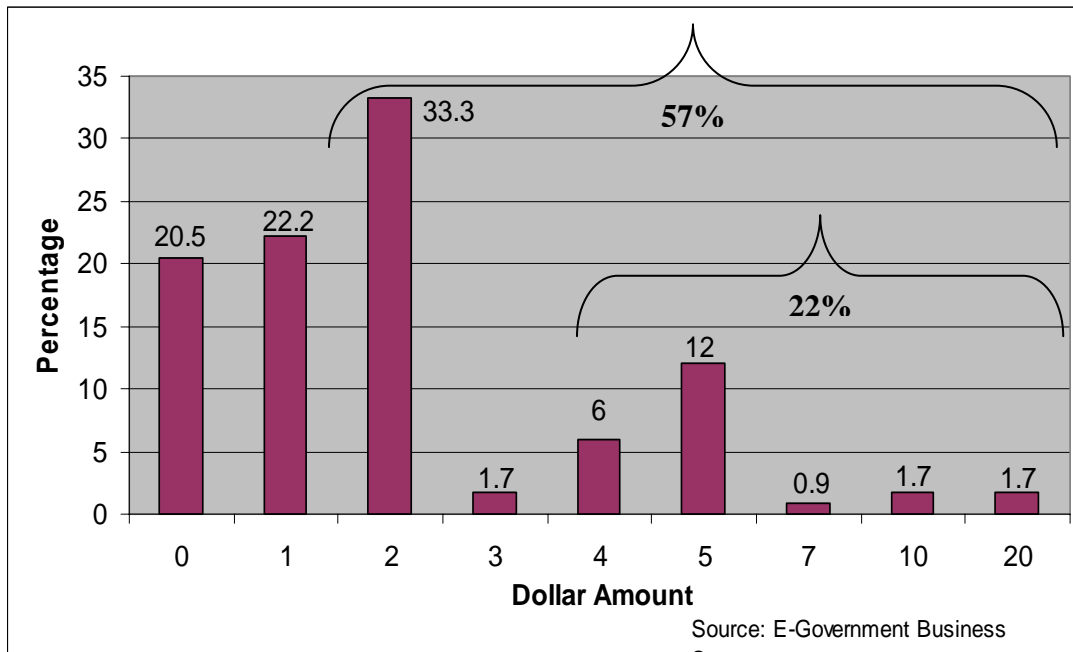
Source: eGovernment Business Survey

The framing effect is very evident in Table 1. Strongly supporting H3, the results indicate that firms are even more willing to conduct a transaction online if they perceive that they can save money by doing so. Half of the firms were asked if they would be willing to conduct the transaction online if it would save them money in transaction costs. About 92 percent of firms regard a minimum savings of \$2 as a favorable condition for them to obtain their desired information and services online. About 85 percent of the firms indicate a minimum savings of \$4 is important for them. To get at the maximum amount that they are willing to pay, we asked them whether they would be willing to obtain the service online if their company could just break even on the transaction cost. When presented as potential savings, most firms (95 percent) are willing to forgo all possible savings by paying fully for the difference between an online option and the second least cost option to them.

Half of the firms also were asked for the highest amount of user fees they were willing to pay for a service that was available online. The firms were willing to pay an overall average of \$2.34 per transaction online for specific transactions the firm needs to conduct with a state agency (Table 1). Responding directly to each of three specific transactions the firm would like to conduct online, the average maximum acceptable charge ranged from \$2.35 to \$1.85 per transaction. (The median is also reported for each transaction in Table 1.) As seen in Figure 3, about 57 percent are willing to pay at least \$2 per transaction. A little over 20 percent of the firms are willing to pay 4 dollars or more. The question about the maximum amount gave firms the opportunity to indicate a value of less than 2 dollars. About 20 percent of firms do not want to pay for anything, indicating a zero dollar fee is the highest amount that they are willing to pay for online transactions. Twenty-two percent of firms are willing to pay a one dollar maximum whereas another 33 percent are willing to pay a maximum of 2 dollars. The maximum amount that a business indicated that they would be willing to pay is 20 dollars for each transaction.

We have confidence in these estimates due to the mixed format of closed and open questions in the contingent valuation question sequence. Hanemann (1994, 23) observes that “There is abundant evidence that respondents find the open-ended willingness-to-pay question much more difficult to answer than the closed-ended one; for market and nonmarket goods alike, people can generally tell you whether they would pay some particular amount, but they find it much harder to know what is the most that they would possibly pay. Indeed, the experience with open-ended willingness-to-pay questions for market goods is that people are more likely to tell you what the good costs than what it is worth to them.”

Figure 3. Maximum Fee Willing to Pay for Online Transaction (Open Question)



Hanemann also notes that, ‘With the open-ended format....there are strategic reasons for stating less than one’s full value—a theoretical result strongly supported by experimental evidence. This is not so with a closed-ended format (Hanemann 1994, 23). This caveat applies to both our maximum savings and maximum payment questions. While the exact amount of a savings to break even is unknown to the firm at the point of the question, the responses to the fixed points of \$2 and \$4 reinforces the mean and median responses to the open-ended questions. Further, these responses suggest that marketing campaigns which carefully and accurately frame the transaction costs can yield increased willingness of firms to pay a service charge for an online service. Taken together, the responses of firms indicate a willingness to pay a modest service charge, between \$2-\$4, framed in a calculation that the online service option will actually save them money, even after paying a service charge for the option. The amount the agency may charge as a service fee depends upon the type of transaction a firm conducts, as we see in the next set of results.

The results presented in Table 1 are aggregated from responses to very specific transactions each firm had identified it wished to conduct with the state online. Their demands for specific online services is measured both by the desire for a service and a willingness to pay for that service. Getting permits is the number one transaction that Iowa firms prefer to do online. This has the highest maximum fee amount of approximately \$4 that these firms are willing to pay (on average) for an online transaction. Examples of this transaction include getting construction permits and water permits. Specialized business information is the second highest desired service. Firms are willing to pay (on average) up to \$3 for each. Examples include finding specific Uniform Commercial Code (UCC) related information and searching for physicians. Contract bidding is another highly desirable service area, with firms willing to pay (on average) a maximum of \$3 for the online service.

Filing taxes online and doing licensing on state web sites follow closely behind, with firms willing to pay (on average) about \$2 as the highest user fees.⁵ Examples of taxes mentioned include sales tax, payroll tax, and withholding taxes. Licensing includes contract licensing, professional

⁵ The survey was conducted just before the Iowa Department of Revenue announced the availability of online filing of sales and withholding taxes for firms beginning in 2005. We retain the discussion in the paper to indicate to other states and governments the demand for online filing of various taxes.

licensing, and others. Seeking employee information and filing reports and claims constitute the group of transactions that firms are willing to pay (on average) a maximum of \$1.50. Employment-related information includes criminal history, unemployment information, and child support. Examples of transactions involving reports and claims are mostly unemployment reports, filing court paper, and chemical-related ones.

Discussion and Conclusion

Access to the Internet does not seem to be an issue for Iowa firms. They are active participants in the Internet Age. Based on the survey, 84.5 percent of firms are currently online. Another four percent will connect to the Internet by the end of 2005. The penetration rate is close to 90 percent, effectively mitigating digital divide issues with respect to business services by state agencies. A high penetration rate of broadband connections is another feature of Iowa firms. Broadband connection is available for every three of four Iowa firms (76%) that are currently online. As expected, larger firms are more likely to be connected online and use broadband services than smaller firms. We expect this business profile is similar in other states in the US.

The prevalence of Internet connections and, more importantly, high speed connections place these firms in a good position to interact with state agencies online. As a result, the state government can focus on providing electronic services that are relevant to those firms rather than on ensuring access. Moreover, the state can develop and implement high-performing online transactions that only work well with high-speed connections. For the small percentage of the firms not connected, the study suggests that lack of need—not cost—is the main barrier. If the State of Iowa is able to provide more convenient and lower cost services, these firms are likely to use them. Firms see both benefits and costs associated with conducting e-commerce with government. As in many other states, there is a significant opportunity for the State of Iowa to more fully develop G2B services in the transaction stage of eGovernment development.

This discussion returns us to the Transactions Pyramid (Figure 1) to compare the survey results with the pricing framework suggested by the pyramid. The survey results suggest that basic services such as paying taxes online should not be attached to a transaction fee; instead, development and maintenance of these online transactions should be supported with general tax dollars. The specialized services at the top of the pyramid are not common transactions. We could not identify any specific transactions from the survey data that immediately pertained to this category; however we expect that such demand exists, for example with GIS data requests.

Our analysis has been focused on the middle tier. Our results suggest that optional online services, including license renewal and filing claims, are amenable to a service fee in the range of \$2-\$4. These fees could cover most or all of the development and maintenance of the online service option. Iowa firms are in support of paying approximately 2 dollars on average for the convenience of conducting their important transactions with state government online. These firms were made aware of the full cost involved (such as gas, traveling time, wait in line, postage, or mail delay) to put the convenience of online transactions in context. When thinking in terms of savings from their offline methods of transactions, Iowa firms seem to be willing to pay a little more.

The willingness of firms to pay service charges indicates an economic gain as the result of providing eGovernment services. At a minimum, Iowa firms see the value of an average \$2 per transaction to make services available online. These results show a strong preference for firms to see some savings in conducting transactions online, but it is not necessary. The savings are put in the context of full transaction costs, including gas, traveling time, waiting in line, postage, or mail delay. This means firms might not be discouraged by being charged a few dollars to conduct transactions online because traveling and waiting in line is likely to cost them more. Interestingly, savings are not really necessary. Over 95 percent of firms are willing to conduct the transaction online if they can break even. This implies that firms are willing to pay an online transaction fee less than or equal to the difference between the second least cost option and the online one. The pressing issue is how to finance the development of online services, given empirical demand for specific services and support for some level of user charges.

Taylor (2003, 41) correctly argues that there is “no pure play” for deciding to fund IT improvements with general fund or user charges. The solutions will require a combination. In that vein, states will do well to develop a longterm financing structure that enables them to develop the broad range of G2B commerce envisioned in the transactions phase of the eGovernment development model. In doing so, they must pay attention to who benefits from the services and to what extent there are social benefits worthy of public investment (Robbins and Miller 2004). The enterprise fund model suggested by Johnson (2002) has much merit. Capital investments from the general fund for IT infrastructure in the transactions phase should correspond to the social benefits from the investments. At the same time, states should not be wary of charging service fees for firms, because there are no digital divide issues with respect to firms and there is an underlying willingness of firms to pay for direct benefits to a firm. Framing effects evident in Table 1 suggest several important considerations.

First, pricing structures of services should adopt business sector practice and roll “costs of doing business” into product pricing. Specifically, there should be no explicit credit card or EFT *surcharge* to reimburse agencies for these transactions costs. The evidence is clear. The survey results suggest that it is important that this charge be a generic transaction fee rather than a surcharge to cover a particular payment method. Firms are willing to pay for the convenience, but they are resistant to an obvious surcharge to cover credit card costs or other payment fees. About 20 percent of Iowa firms are unwilling to pay even an additional dollar or one percent to have the credit card or charge account option available. An EFT surcharge approach is likely to result in lower adoption rates of online transactions and a consequent reduction in the ability of agencies to cut operational costs.

Instead, a generic service charge will generally be accepted, up to the amount a firm believes it will save in transaction costs for a paper option. Consumers do not know how much of the price of a quart of ice cream accounts for the cost of paying for it with a credit card; it does not matter. The cost of the credit card service is allocated across all the products in the store. The public sector should adopt the same practice for G2B e-commerce. Electronic fund transfer and traditional paper check options, are payment methods preferred by Iowa firms transacting with state government. State governments should note the popular demand for electronic fund transfers, including ACH and e-checks, as a way for firms to pay for their transactions with government. A substantial majority of firms in our study would like to see EFT as an option, the costs of this payment method should be incorporated into the transaction fee structure for a particular service or agency. To the extent that EFT and credit card payment methods increase overall efficiency of agency operations, they provide widely distributed social benefits resulting from the lower cost of government. Applying public finance principles, some portion of that EFT cost is appropriately supported by general fund monies.

The second point is that framing the transactions costs matters. There are two options for states to consider. First, accounting for relative prices, agencies can raise the general fee for a service (license, permit, etc.) but not for the online option. This decreases the nominal and real price of the online option with respect to a paper transaction and will induce firms to move to the online version. Alternatively, agencies can use an effective marketing campaign to demonstrate online savings and “frame” the service charge as actual savings in Transaction costs. Either is possible in a broader, flexible pricing structure. Note that the term “service charge” itself is a word choice that mimics the private sector and should increase their acceptability.

Creating a flexible pricing structure requires two transformations in many states. First, it may take legislative changes to permit agencies that kind of pricing structure flexibility. Agencies should be freed from legislative interference in how firms pay for services; particular effort should be made to eliminate laws that restrict or otherwise mitigate against an agency’s ability to accept credit card and EFT payments. In Iowa, for example, agencies are required by law to deposit all monies collected for the various license or filing fees into the general fund; they are not allowed to first deduct payment of credit card charges from the monies collected. The effect is force agencies to ask the legislature to “fund” the payments for credit card charges (increasing their general fund budgets) or to levy a

surcharge on the credit card and EFT payments. Since legislatures are not inclined to increase agency budgets, the most feasible option is the surcharge.

The politics of the general fund budget are consequently an impediment to further development of the transactions phase of eGovernment evolution. Existing finance laws that do not accommodate the fact that fees must be paid on credit card and EFT payments force agencies to erect an obstacle to more efficient government by increasing the price of an online transaction relative to the traditional paper option due to a surcharge. The restrictions are more onerous given that state agencies must maintain dual systems (manual and electronic) until such time as there is such a predominance of electronic access that manual systems can be discontinued.

This situation is a problem in many states beyond Iowa. We believe the solution lies in Johnson's (2002) argument for an enterprise fund approach to eGovernment evolution. States should consider creating an eGovernment Enterprise Fund for the development of an online transactions pricing structure. There are inherent social benefits to the more efficient government operations expected with an online transactions approach, and initial and periodic infusions of general fund capital will be warranted as a catalyst to the development of online services by state agencies. For the most part, however, the financing of online developments and maintenance can be funded with transactions service charges less than or equal to the savings firms will experience in transactions costs over the traditional paper option. An enterprise fund approach may take the form of an eGovernment Enterprise Authority that is quasi-governmental and free from many of the pricing constraints associated with general fund financing. The merits of that approach warrant more research and discussion in each state.

Ho (2002) and others note that a second transformation refashioning governments into customer-driven service agencies will require shifts in the administrative paradigm from silos to interconnectivity. The vertical and horizontal integrations described in third and fourth stage eGovernment development models require agencies to lose their proprietary perspective over the information they manage and think enterprise-wide to permit firms to more easily file multiple permits and conduct other transactions with a variety of agencies with lower costs, including transaction costs.

To enable the third and fourth stages of G2B services, states need to creatively structure the financing for eGovernment. The analysis and model we have presented here suggests that creating an enterprise fund structure will permit states to contribute general fund investments to lower the overall cost of government while also allowing agencies to capture the revenues from service fees priced relative to the value of reduced transactions costs to the firms. These results are generalizable beyond the state of Iowa. We are confident that the business profile in Iowa is similar to that of other states, though with some degree of variation to be sure. More importantly, we hope that the transactions cost and indifference curve analyses—and the consequent model for an enterprise fund approach to G2B financing—is relevant to US state and local governments, and to governments in other countries as well.

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Appendix A: Methodology

The project began with a comprehensive review of 46 Iowa state government web sites to determine a reliable list of electronic government services currently offered to Iowa firms. Researchers collaborated with ISU's Center for Survey Statistics and Methodology Center to develop a telephone questionnaire for the survey. Pilot interviews were conducted with six local business representatives to help identify any troublesome items and adjustments were made to the questionnaire based on the results. A total of 800 telephone calls were made resulting in 432 completed telephone surveys.

The survey center randomly selected 1500 firms from about 149,000 Iowa firms were identified using the 2004-2005 edition of DirectoriesUSA's Iowa Business Directory to produce a final sample of 800 firms, stratified by Standard Industrial Classification (SIC) code groups and by number of employees. The sample of firms included non-profit organizations as well as for-profit firms, since both types of establishments would have contact with state offices and agencies. In some cases the sample also included multiple locations for the same business. We attempted to gather information one time for the business as a whole and recorded secondary locations as ineligible.

Advance letters were sent to firms identified in the sample to explain about the project and to inform them that an interviewer would try to contact them shortly. These letters were addressed to the contact person listed in the sample file, although any knowledgeable person at the business would be eligible to be interviewed. Attempts were made to contact all firms in the sample. Phone numbers with no personal contact were checked to verify accuracy and then were rotated through a minimum of 12 call attempts at various times. Disconnected phone numbers were verified and attempts were made to locate working numbers for those firms.

Standard interviewing protocols were followed by survey center staff throughout the project. The interviews were 15 to 20 minutes in length. CATI software was programmed to include edit checks to detect illegal values and logic errors as responses were entered into the computer during the interview. Data retrieval callbacks were made to the respondent by the original interviewer or supervisor when required. Basic frequencies and cross tabulations were analyzed to catch entry or coding errors, and corrections were made as needed.

Table A-1 represents the survey sample and shows the results of the center's attempts to interview the 800 sampled cases. Approximately 6% of the sampled cases were not eligible, either because they were out of business, a duplicate listing, or simply not a business at all. About 4% of the firms could not be located. The refusal rate was 23%. About 15% of the eligible sample received a maximum number of call attempts before being finalized. Interviews were completed with 432 firms, for an overall response rate of 57%.

Table A-1: A Breakdown of Sampled Firms

	Total	%
Total Sample	800	
Ineligible	45	5.5% of 800
Eligible Sample	755	
Cannot be located	33	4.4% of 755
Maximum Calls	112	14.8% of 755
Fax only	4	0.5% of 755
Refused	174	23.0% of 755
Completed Interviews	432	57.2% of 755

Reported sample percentages are statistically valid within $\pm 5\%$ at the 95% confidence level. This means that, if 54% of the respondents answer a certain question affirmatively, the true percentage in the overall sampled population has a 95% chance to be between 49% and 59%.